SOIL SURVEY OF KENT COUNTY MD.

By JAY A. BONSTEEL.

GEOGRAPHY.

Kent County occupies an area of 315 square miles, located in the northern portion of the Eastern Shore of Maryland. The county is separated from Delaware on the east by a line run by Mason and Dixon and marked by mileposts, set in the latter half of the eighteenth century. The western boundary of the county is formed by the upper portion of Chesapeake Bay, while the Sassafras River separates it from Cecil County, Md., and the Chester River divides it from Queen Anne County. Chestertown, the county seat, is the largest town, having a population of about 3,000. Washington College is located there. The county is located between the parallels of 39° and 39° 22′ north latitude, and between the meridians of 75° 45′ and 76° 16′ west longitude.

Both the Chester and Sassafras rivers are navigable within a few miles of the Delaware line, and these, with Chesapeake Bay, afford fine facilities for water transportation. The highest elevations above tide water are reached near the mouth of the Sassafras and near Kennedyville, where an altitude of 100 feet is attained.

PHYSICAL GEOGRAPHY.

Kent County is naturally divided into two main physical divisions. The greater part of the county consists of a low upland between 50 and 100 feet above tide level. This higher area is bordered along the Chesapeake Bay and, for a part of the distance, along the Chester River by low-lying forelands ranging in elevation from 10 to 40 feet above tide water. The line of division between the two areas is indicated by a well-marked cliff escarpment over a large part of the area, as at a point one-half mile southwest of Langford, though along the Chester River this feature is not so well shown. These two divisions not only differ in elevation, but each has its own well-marked soil types and its own agricultural conditions.

The foreland area is much indented and divided by tide-water estuaries branching from Chesapeake Bay or Chester River, while the upland area is only slightly cut into by tide water, but is everywhere seamed and dissected by stream courses. The foreland possesses few, if any, streams capable of furnishing water power for milling purposes, while many of the upland streams have long been used as sources of power. The bays and inlets of the lowland facilitate water

transportation, while they make overland communication circuitous and slow. The upland is well supplied with highways, which easily cross the stream courses and cover the county with a good series of roadways, while it is necessary to descend to one of the larger waterways to secure access to water carriage. These facts, combined with soil differences, serve to accentuate the mere differences of elevation.

The main divide existing between the drainage systems of the Chester and Sassafras rivers is a poorly marked flat upland, which merely indicates the points to which stream heads have so far eroded, rather than a sharp division line dividing two well-defined stream systems. In the eastern part it consists of poorly drained, nearly flat areas, where water stands as though undecided which course to take. To the west, on account of the greater fall and the shorter distance to tide water, the streams have established better defined courses and the upland is well drained.

Nearly all of the streams which do not actually flow into tide-water estuaries descend to deeply cut, flat-bottomed areas, which are usually swampy. These areas have been actual tidal embayments at a recent geologic period, but the rapid deposition of material by the streams themselves has built up large extents of marsh land. Even the Chester and Sassafras rivers have suffered in this respect, and navigation has been impeded by this continued deposition of sand, silt, and clay brought down by the minor streams. Dredging has been resorted to in some instances to keep open the approaches to important landings along the rivers.

None of the streams of Kent County have cut deep gorges, except near their mouths, and none of them have very rapid currents. Some of the larger streams which maintain their flow during the entire year have been utilized for local milling purposes.

Along wave-beaten shore lines the force of the attack is cutting away cliff lines and the lateral sweep of the waves is slowly transporting the materials thus derived to more sheltered areas, where sand bars and sand spits are being built up. Some of these are forming across the mouths of various estuaries, forming landlocked harbors of small extent. Behind the bars the material brought down by streams is being deposited, and the estuaries still in existence are slowly being brought to the state of those already filled to the marsh condition.

GEOLOGY.

Kent County lies entirely in the Coastal Plain of Maryland, and its surface features are due almost exclusively to the sediments deposited in Pleistocene time and since elevated above sea level and weathered and eroded until the present time. The basal structure of the county is made up of greensands of Cretaceous and Eocene age, and these sands have contributed to the materials built into the newer formations. The Norfolk sand type of soil owes its origin almost exclusively to the reworking and redeposition of these older sands. The

other loams and clay loams of the county fall within the later divisions of the Pleistocene, as outlined in the Calvert County report.

The correlation of the soils with the geological formations of Kent County shows that the Sassafras loam, the Sassafras gravelly loam, the Susquehanna gravel, and part of the Norfolk sand and meadow occur in the Wicomico division, while the Elkton clay, part of the Norfolk sand, and the large foreland meadow areas belong to the Cape May division. Physiographically, the Wicomico comprises the interior upland portion of the county, while the Cape May includes the bordering foreland areas.

SOILS.

SASSAFRAS LOAM.

Sassafras loam covers a total area of over 130 square miles (87,000 acres), lying wholly within the upland portion of Kent County. This soil is typically represented both in Kent and the Coastal Plain portion of Cecil County, though it is by no means confined to these areas nor to the Eastern Shore of Maryland.

As a rule, the surface of this formation in Kent County is slightly rolling and the areas possess sufficient irregularity of surface to allow of good natural drainage. In some instances small saucer-shaped depressions still exist unaffected by the general stream erosion, but short surface ditches or, better, a well-like drain down through the subsoil to underlying sandy layers will suffice to bring these wet places into good cultivation.

The soil proper consists of a fine brown loam, which is often slightly sandy, especially in the eastern part of the county. It extends to an average depth of about 9 inches and is underlaid by a uniform yellow loam subsoil. The subsoil varies in thickness from about 20 inches to a maximum of 5 or 6 feet. It forms a supply reservoir capable of maintaining a large amount of soil moisture during the growing season, and it is as important a factor in the productivity of this soil type as the soil proper. Underneath the true subsoil is usually found a layer of rather coarse gravel mixed with large-sized bowlders and coarse sand, frequently cemented to a solid mass by the long-continued deposition of hydrated iron oxide. When in this state the gravel band is known as hardpan.

Below the gravel layer there is usually found a bed of medium to coarse red sand mixed with fine gravel and interspersed with seams and beds of gravels. Sometimes masses of clay are incorporated with this material. These lower-lying, coarser materials have little effect upon the higher upland areas of this soil type beyond furnishing a natural underdrainage, but where the higher-lying surface becomes thinner, as it descends toward stream beds, the lower-lying, coarser material sometimes mingles with the finer-grained soil material sufficiently to produce a different soil condition.

Sassafras loam is carefully cultivated over almost its entire extent,

hence little, if any, of its original tree growth remains to indicate what the natural productivity of the soil brought forth.

The soil is well adapted to general farming. It lies between the limits of the heavy clay soils and the light sandy soils, and is capable of producing a wide range of crops in generous amounts. It forms the typical corn and wheat soil of the county, producing wheat at a rate of from 15 to 20 bushels per acre, the quantity varying with the season and with the state of cultivation of different farms. Corn yields about 50 bushels per acre. Large orchards of Kieffer pears are found on this soil, and while peach raising is not so largely followed now as formerly, many peach orchards, both old and new, are found on the Sassafras loam. The production of tomatoes, peas, and of other canning crops is also carried on on this soil, while extensive asparagus beds are found in its area. Stock raising and dairying are followed, and many flocks of sheep are to be found, chiefly upon this soil formation.

The diversity of interests already supported by this soil mark it as a highly valuable farming area for general purposes.

The texture of the Sassafras loam is shown by the following mechanical analyses:

Mechanical analyses of Sassafras loam.

No.	Locality.	Description.	Organic matter, and loss.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.
5187	One half mile W. of Betterton.	Brown loam, 0 to 8 inches.	3.32	Tr.	0.98	0.79	1.28	18.55	66.88	8.28
5189	Three-fourths mile NW. of Langford.	do	3.15	0.38	1.94	1.46	2.20	18.63	61.30	10.18
5188	Subsoil of 5187	Heavy red loam, 8 to 36 inches.	2.42	0.00	Tr.	.83	.82	16.51	63.62	15.76
5190	Subsoil of 5189	do	2.99	Tr.	1.55	1.22	1.85	16.72	62.36	13.30

SASSAFRAS GRAVELLY LOAM.

In many instances where the slope from higher to lower levels is not steep enough to bring the heavy gravel band of the upland region to the surface as an outcrop, areas of decidedly gravelly soil are found. These owe their origin to the fact that the Sassafras loam is not so thickly developed over the areas as to cover in and obscure the underlying gravel completely, though enough of the finer material is present to constitute by far the larger part of the soil mass. Such areas are usually found on long, gentle slopes near or between the larger stream courses. Large tracts occur northwest of Millington and northwest of Chestertown, while smaller areas are found throughout the upland part of the county.

The surface of this soil type is generally sloping or rolling, and some of the smaller areas occur as bands along the gently sloping banks of smaller streams and near stream heads.

The soil consists of a brown, slightly sandy loam, containing a scattering of gravel, which often amounts to 10 per cent. This is underlaid by about 2 feet of heavy red or reddish-yellow loam, also containing gravel, which is, in turn, followed by red sand and gravel mixed with iron crust. The less depth of heavy subsoil in this type and the consequent influence of the underlying sands and gravels are more important factors in differentiating it from the Sassafras loam than is the presence of the gravel in the soil. All these factors, however, combine to constitute a lighter soil type and to make it adaptable to other agricultural purposes.

Like the Sassafras loam, this soil comprises lands, chiefly cleared, which have long been cultivated. The absence of natural tree growth precludes any conclusions drawn from natural conditions.

Sassafras gravel loam approaches more nearly to a strictly corn-producing type than to a wheat land, and it is also suited to the production of late truck crops, like those used in the canning industry. Sugar corn, tomatoes, peas, and other crops produce well on similar soils, and the climate of Kent County favors these crops. Nursery stock and small fruits can be raised on this type of soil, and, while the wheat crop usually produces best on heavier soils, a fair crop can be raised on the Sassafras gravelly loam.

The following table shows the sandy and gravelly character of this soil, at the same time indicating the presence of sufficient silt and clay to form a truly loamy soil. The mechanical analyses gives the texture of the fine earth only. A separate determination of the larger gravel was made.

Mechanical analyses of Sassafras gravelly loam.

No.	Locality.	Description.	Organic matter, and loss.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
5197	2¼ miles NW. of Chestertown.	Brown sandy loam, 0 to 10 inches.	3.59	2.42	6.27	5.34	4.34	8.50	58.69	9.91
5199	1 mile NW. of Millington.	....do.....	2.55	3.24	10.02	8.34	8.85	12.35	45.10	9.88
5198	Subsoil of 5197.....	Red loam and gravel, 10 to 24 inches.	2.91	1.36	3.99	4.60	3.29	9.08	56.16	18.47
5200	Subsoil of 5199.....	Red loam and gravel, 10 to 36 inches.	2.14	3.27	10.43	8.57	10.91	13.88	36.42	14.37

Coarse gravel, from 3 to 5 per cent in all four samples.

SUSQUEHANNA GRAVEL.

Along the slope which separates the upland portion of Kent County from the foreland areas and along the steeper slopes down to stream areas the stony and gravelly layer underlying the Sassafras loam almost universally reaches the surface and its materials mingle with those of overlying and underlying formations. Thus, a narrow band of steeply-sloping, stony soil is formed which forms a marked line of separation between other distinct soil types. Originally this layer of gravel could have formed only a narrow band of a width equal to the extent of the beveled edge reaching the surface on the slope, but long continued freezing, thawing, rain washing, and the action of gravitation have spread the stone and gravel over much wider areas and produced a stony soil.

This soil contains from 20 to fully 50 per cent of coarse gravel in certain places. The other finer material may be sandy, especially on slopes where the underlying sand formations reach the surface, or it may be composed of silt and clay washed down from the Sassafras loam.

The stony areas are frequently cultivated to the same crops as the other soils above and below, but they differ from them largely in ease of cultivation and in the varying degrees of productivity. Usually they are not sufficiently extended to warrant any special treatment or crop, though some of the slopes closely resemble soils devoted to vineyard interests in other localities.

It would not be possible to remove completely even the larger stone from these areas, as the supply from the gravel bands is almost inexhaustible, and new crops of stone would work out into the soil so long as cultivation and atmospheric influences have access to this material.

NORFOLK SAND.

Norfolk sand covers a total extent of nearly 30 square miles (about 20,000 acres) in Kent County. The largest single area of this soil type occurs in the southeastern part of the county. Here the surface of the land rises from near tide level along the Chester River to elevations exceeding 60 feet. The surface is gently rolling and quite generally forested. The higher elevations consist of low, rounded hills and hummocks of sandy soil, interspersed with hollows which are usually swampy, and contain accumulations of partially decayed organic matter mixed with silt.

Along the shore of Chester River the lower-lying land is quite generally sandy from near the water's edge up to 20 feet elevation. In the foreland region of Kent County, beginning near Chestertown, there are found detached and scattered areas of this sandy soil, often comprising 2 or 3 square miles each. From Rock Hall southward to Eastern Neck Island this soil is also predominant, though composed

of slightly finer-grained material than elsewhere in the county. Near Worton Point and on the extreme end of Still Pond Neck this soil is again present in its coarser phase. Other smaller areas of Norfolk sand are found over the upland, while the outcrop of the sandy underlying strata of Cretaceous, Eocene, and even of Pleistocene age, in the deep stream cuts along the Sassafras River, gives rise to small areas of Norfolk sand. The areas of this soil found along the forelands are usually slightly rolling or nearly flat, while those along the stream cuts are frequently very steeply inclined and consequently of little agricultural value.

The original sources of the sands entering into the composition of the Norfolk sand vary in different parts of the county. The greensands of Cretaceous and Eocene age consist of rounded quartz grains, glauconite, and some silt and clay. The weathering of outcrops of this material gives a sandy soil, usually found only along very deep stream cuts. This same material when reworked by streams and waves, transported to new localities and redeposited as a later sediment, forms a soil which has the same agricultural values as along the weathered outcrops. In some instances it is possible to secure materials along the present shores from Cretaceous or Eocene outcrops, from the Pleistocene sandy stratum, and on the surface of the new foreland terraces, which differ from one another chiefly in the amount of the glauconite still present. Texturally, they vary but slightly. Owing to this fact, areas due to all these different causes have similar crop values and are included in the same soil type.

The soil of the Norfolk sand consists of a medium to rather coarse sand, with gravel also occurring in some areas. The soil is usually brown or reddish-brown from the admixture of organic matter. It has a depth of about 9 inches. The subsoil also consists of a medium sand, generally red or yellow, frequently containing sufficient silt and clay to make it slightly adhesive. The steeper sloping areas of Norfolk sand have not been entirely cleared, and they are usually marked by a growth of chestnut and oak. The chestnut is found growing on this soil more frequently than on any other.

Norfolk sand is a typical truck soil, although not actually used for such crops to any great extent in Kent County. Near Chestertown and near Worton Point truck and small fruits are being cultivated on this soil, but it is usually farmed to the regular rotation used in the county. The excellent facilities for transportation and the proximity of several large cities should lead to a more pronounced specialization of crops in this region, and the Norfolk sand areas should be utilized as the best truck soil existing in Kent County.

The following analyses show the texture of three samples of Norfolk sand. While all are sandy soils, it is noticeable that the sample from Eastern Neck Island is of a finer texture than the other two samples.

Mechanical analyses of Norfolk sand.

No.	Locality.	Description.	Organic matter, and loss.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
5201	2 miles SW. of Chestertown.	Coarse brown sand, 0 to 8 inches.	1.37	2.66	26.76	27.90	17.37	7.89	12.77	3.03
5205	Eastern Neck Island.	Fine brown sand, 0 to 8 inches.	1.53	Tr.	1.97	3.70	39.27	36.69	13.80	2.79
5209	1¼ miles SE. of Millington.	Coarse brown sandy loam, 0 to 10 inches.	1.72	6.39	21.46	17.81	20.02	8.93	19.09	3.87
5202	Subsoil of 5201	Coarse yellow sand, 8 to 40 inches.	1.04	3.30	26.65	20.86	16.38	8.26	17.90	6.44
5206	Subsoil of 5205	Orange sand, 8 to 40 inches.	1.36	Tr.	2.80	5.50	42.85	26.46	14.70	5.74
5210	Subsoil of 5209	Coarse red sandy loam, 10 to 40 inches.	1.30	5.10	25.04	19.13	18.13	6.40	17.91	6.69

ELKTON CLAY.

Elkton clay occupies a total area of over 25 square miles (16,000 acres) in the foreland portion of Kent County. It usually lies between 15 and 40 feet elevation and its surface is nearly level, or at most only gently sloping. The larger areas of the Elkton clay are found along the bay shore and on the necks which extend out into the Chester River. Only small areas of this type occur eastward from Chestertown, in the southern part of the county, and it is only represented by a single area on the Sassafras River, just east of Shell Cross Wharf.

The materials forming this soil were deposited as a marine sediment during the latest stage of the Pleistocene, and they have since been elevated to their present position above tide water. The low foreland area is largely made up of the same material, but all of it has not proceeded to the same stage of soil formation. It will be noticed with respect to the Elkton clays in Kent County that all the areas lie in positions favorable to natural drainage, that is, they have the advantage either of considerable elevation above tide water or else of so lying that the slopes to natural drainage ways are short and steep. It is due to this position and to the progress of natural underdrainage that most of these areas have been naturally brought to a more productive state than the surrounding meadow lands.

The first processes of soil formation, when any area of sediment becomes a part of the land, are those of drainage and of weathering. The rainfall must be disposed of, and where the slope is sufficient stream ways are formed which dispose of the surface waters. If the material is not too impervious a large part of the rain water percolates through it and finds an underground outlet to main drainage ways.

The water passing underground carries various acids in solution, and these aid in soil preparation. The circulation of air also goes on unless the soil pores are filled with water. When air and water circulation is freely established various chemical and mechanical changes prepare the soil for crop production; but if they are interfered with these changes progress more slowly and the soil is considered wet, cold, and sour.

The materials constituting meadow areas and those of Elkton clay are frequently the same, but the natural processes of soil formation have proceeded much farther in the latter case than in the former.

Elkton clay is a yellow to brown silty loam soil, extending to a depth of about 9 inches. This is underlaid by from 12 to 30 inches of mottled gray and yellow clay loam, which grades imperceptibly downward into a heavy, dense, drab clay. The drab clay was the original form of this material, but the circulation of air and water and of the solutions of various chemical compounds in the water has changed the upper portion of the clay, while surface cultivation has changed the structure of the soil proper and mingled with it various amounts of organic matter.

The yellowing and mottling of the subsoil are due to the oxidation and deposition of iron salts held in the soil water, and this process is still in progress. It has made the heavy, plastic clay more loose and friable, and this aids the underground circulation of soil water.

The growth, death, and decay of organic matter on the surface of the soil and the incorporation of this organic matter with the soil not only furnish valuable plant foods, but also furnish a temporary mulch for the retention of moisture within reach of growing plants and additional organic acids for the further preparation of the deep subsoils.

The natural growth over a large part of the Elkton clay included white-oak, pitch-pine, and sweet-gum trees, and some areas still retain this growth. Other areas have been cleared only in recent years and are not yet fully prepared for their best work in crop production.

Elkton clay is more typically wheat and grass land than any other soil type in the county. The soil and subsoil are sufficiently retentive of moisture to enable grain crops to maintain a steady growth, except during extremely dry seasons. The chief difficulty attending the cultivation of this soil is its tendency to form into clods and lumps.

Wheat crops of from 30 to 35 bushels per acre are reported from different farms located on this soil type, and good grass crops can be obtained. The hay is apt to be rather coarse and of medium grade only, but this is due fully as much to impure seed and lack of proper care as to any property of the soil.

Stock raising should be undertaken more extensively on this soil than it has been, and use of stable manures and lime may be profit-

ably increased. Artificial underdrainage should be undertaken over considerable areas of the Elkton clay in order to facilitate the natural processes already under way.

The texture of this type is shown by the following analyses:

Mechanical analyses of Elkton clay.

No.	Locality.	Description.	Organic matter, and loss.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
5211	One-fourth mile NW. of Pomona.	Heavy yellow loam, 0 to 9 inches.	3.32	0.40	0.73	0.92	1.56	14.70	63.34	14.35
5213	3 miles NW. of Rock Hall.	Brown loam, 0 to 9 inches.	2.89	Tr.	.82	1.14	2.23	18.25	65.49	9.21
5212	Subsoil of 5211	Mottled clay loam 9 to 40 inches.	2.78	0	Tr.	.77	.90	17.96	60.90	16.66
5214	Subsoil of 5213	do	2.54	0	Tr.	1.06	1.92	27.51	51.14	15.59

MEADOW.

The meadow land in Kent County comprises areas of flat, poorly drained land, best adapted to the production of grass or for pasturage. The meadows are not confined to soils of any one texture, but are dependent for their characteristics rather on physiographic than on textural features.

The stream valleys are usually wet, poorly adapted to ordinary tillage, and are of greater value for grazing than for any other purpose. Certain parts of the upland portion of the county are so situated that the natural stream drainage has proved inadequate to prepare them fully for cultivation, and they remain as forest areas. About 1 mile west of Massey an area of nearly 3 square miles still retains its meadow condition, owing to a lack of drainage, though the texture of the soil differs very little from the surrounding Sassafras loam. Two similar areas occur east of Chesterville, the northern one being above 60 feet in elevation and corresponding in texture to the Sassafras loam, the lower area sloping from 60 to 20 feet and resembling more nearly the Elkton clay. All three of these areas are so situated as to be capable of easy reclamation by artificial drainage.

The lower lying portions of the southeastern part of Kent County are also rather wet and fall within the meadow type, though a very little attention to drainage would fit them for the production of celery, cabbage, cauliflower, and late truck crops.

By far the largest meadow areas are found in the lowland division of the county, these areas usually lying between sea level and an elevation of 20 feet. They owe their present condition chiefly to lack of drainage.

The foreland portion of Kent County is the youngest part geologically, and drainage systems are not yet completely established. As a result, those areas which lie near water level are saturated nearly to the surface, and the meadow condition is the only one possible.

The natural growth on all of the meadow areas consists of willow oak, sweet gum, and other water-loving forms. The main forest areas of the county are found on the meadow areas, though they are not all of them forested. Recent removals of forests have thrown some of the foreland areas into cultivation, and wheat and grass are produced to fair advantage. The production of corn is not successful, for in wet seasons planting is usually prevented until late, on account of the water-soaked condition of the ground, and in time of drought the surface bakes to such an extent that growth is interfered with, and the crop becomes yellow and backward. This yellowing is known locally as "Frenching." Underdrainage, in order to permit better circulation of the air, and frequent shallow surface cultivation, in order to form a soil mulch, would help to prevent this baking.

The soil of the lowland meadows consists of a gray loam, having a depth of about 8 inches. The subsoil is a blue or gray clay loam which is very heavy and plastic when wet, but on exposure to the air usually bakes to a hard surface. The clayey subsoil contains considerable silt.

The meadow lands of Kent County may be reclaimed by underdrainage, and thus be added to the grain producing areas of the county. The upland meadows are so situated that drainage ditches may be cut to the heads of existing streams with laterals ramifying over the areas. Then local underdrains should be provided for each field. The only question involved is that of the comparison of the expense with the results to be obtained. The lowland meadows in some cases lie too near tide level to be reclaimed easily, but many of the areas now grown up to sweet gum and willow oak could be made to produce wheat and grass if properly drained.

The following analyses of meadow soil is directly comparable with the sandier phase of Sassafras loam, and underdrainage should increase its value and productiveness:

Mechanical analyses of meadow.

No.	Locality.	Description.	Organic matter, and loss.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
5217	1¼ miles NE of Chesterville.	Heavy yellow loam, 0 to 9 inches.	2.97	2.78	8.56	5.35	6.99	14.30	47.15	11.95
5218	Subsoil of 5217	Yellow clay loam, 9 to 40 inches.	2.59	2.37	8.17	5.96	7.37	9.85	46.83	17.16

SWAMP.

Swamp lands of Kent County fall into two classes—salt marshes and fresh-water marshes. The salt marshes occupy positions along the estuaries, and are subject to inundation by the highest tides, while the fresh-water marshes are usually formed along the upland streams, where the slope is insufficient to carry off all the surface water. The salt marshes comprise by far the larger area. Neither type is at present of any great agricultural value. When the value of lands in the East becomes greater, the tide can be excluded from the swamp marshes by diking, while artificial drainage will obliterate the fresh-water marshes, but so much other land remains in the East, either in forest or in a low state of cultivation, that the marsh areas are apt to play but a small part in agricultural operations for many years to come.

CONDITIONS OF AGRICULTURE.

Kent County has been an agricultural community from the time of its early settlement to the present day. In earlier times the county was divided into large manorial estates and later subdivided into smaller farms. Some of the farms have remained in the possession of single families for two hundred years. The effect of this long tenure is evident in the general prevalence of substantial farm buildings and in the high state of cultivation to which a very large proportion of the land has been brought. Substantial houses are found in all parts of the county, each forming the center of a group of farm buildings. The boundary lines and roads are marked by osage hedges, and long avenues of trees leading from the main highway to the residences are frequently found. The crops of early times were largely confined to the grains, while within recent years the cultivation of truck and canning crops has been introduced. The greatest recent change, however, began with the rise of the peach industry. Thousands of acres were devoted to peach orchards, and a full crop and fair prices brought excellent returns. For many years the peach crop was maintained, but the opening of new areas to the cultivation of the fruit affected the markets, and as the orchards grew older they became more subject to various diseases, in spite of every care, and at present the acreage devoted to peaches is decreasing rather than increasing. The Kieffer pear has been introduced along with other varieties and proves a wonderful producer. The pears are sold to local canning companies at prices varying from 8 to 25 cents per bushel, and even at the lowest price some profit is derived. Tomatoes are raised extensively as a canning crop and usually yield fair returns. Asparagus beds are found on many farms, and small fruits are being cultivated to a limited extent. The areas of Norfolk sand found in the county are well adapted to the production of truck and

small fruits, such as strawberries, raspberries, blackberries, currants, and grapes.

Dairying, stock raising, and sheep raising are other farm industries of the county. Several creameries manufacture butter. The dairy industry should be made to supplement the canning industry. Sweet corn can be produced in Kent County for canning purposes, rendering a cash return of from $18 to $25 per acre for the green ears. The forage crop remains and may be cured and stored for dry feeding or, better, may be shredded and stored in silos for green feeding. The advantage to be derived from the cash return from the canning factory and the creamery is not the only benefit obtained from this practice. The item of farm expense annually charged to the fertilizer bill may be very largely eliminated by the production of increased amounts of stable manure. Moreover the item of transportation charges is also reduced. The nearness of such markets for dairy products as are furnished by Washington, Baltimore, and Philadelphia should awaken the community to the desirability of increased dairying along the most modern lines of development

TRANSPORTATION.

Kent County is well situated with respect to transportation facilities, both for internal communication and for egress to the centers of commerce and trade along the Atlantic seaboard.

The county is bounded by over 80 miles of coast line. The head of navigation on both the Sassafras and Chester rivers is not reached until near the Delaware line, and the entire western limit of the county is formed by Chesapeake Bay.

Five or six steamboat lines carry freight and passengers to Baltimore and Philadelphia, and during the grain and fruit seasons extra freight steamers are provided. Ice only interferes with navigation during periods of excessive cold. In addition to the opportunities for navigation two railroads cross the county, one having its terminals at Chestertown and at Clayton, Delaware, while the other connects Centerville, Queen Anne County, with the trunk lines farther north, entering Kent County at Millington and crossing the Delaware line at Golts. The railroads cross each other at Massey, and together furnish rail communication with trunk lines.

Kent County, having no elevations above 110 feet and no steep grades except near the largest streams, should possess one of the finest highway systems in the State, for, while the consolidated rocks necessary for the building of macadam roads are not found in Kent County, large supplies of suitable rock exist within easy transportation distance, or other materials found in the county may be used. The gravels of Kent County are in some cases highly indurated by iron cement, and when in this condition can be packed to form a fair

road surface. The present system of road construction, judged by its results, might be considerably improved without increasing the money expenditure. The necessity for good drainage and grading does not seem to be fully understood, nor are the known sources of gravel supply for road surfacing used. The art of rolling a road surface into a compact mass also seems to be unknown. Aside from the advantages of soil and climate no interest is so vital to an agricultural community as a good transportation system, and good highways form an essential part of the system.

CLIMATE.

The following table, compiled from the Maryland Weather Service, Vol. I, presents the summaries of climatological observations taken at Chestertown. The blanks represent months for which the record has not been kept during the five years necessary to establish reliable means.

Climatological data for Chestertown.

Month.	Mean monthly and annual temperature.	Mean maximum temperature.	Greatest departure above.	Greatest departure below.	Mean minimum temperature.	Greatest departure above.	Greatest departure below.	Mean daily range.	Highest recorded temperature.	Lowest recorded temperature.	Mean monthly and annual precipitation.
	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	Ins.
January	32	39	+4	−2	26	+5	−3	13	63	5	2.9
February	33	39	+3	−7	25	+4	−9	14	61	− 9	2.6
March	42	.....	.....	.....	.....	.....	.....	.....	79	16	3.3
April	51	.....	.....	.....	.....	.....	.....	.....	87	25	4.0
May	63	73	+5	−3	54	+4	−2	19	92	37	4.7
June	71	81	+2	−4	61	+2	−2	20	94	43	3.9
July	76	84	+2	−3	67	+2	.....	17	97	54	3.5
August	74	.....	.....	.....	.....	.....	.....	.....	93	51	5.4
September	70	.....	.....	.....	.....	.....	.....	.....	90	41	3.4
October	55	63	+3	−2	47	+4	−6	16	83	30	3.0
November	46	52	+4	−4	38	+4	−3	14	75	22	3.3
December	36	43	+2	−2	29	+3	−3	14	65	9	2.7
Annual	54	.....	.....	.....	.....	.....	.....	.....	97	− 9	42.6

NRCS Accessibility Statement

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at 1-800-457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

U.S. DEPT OF AGRICULTURE
DIVISION OF SOILS
MILTON WHITNEY, CHIEF.

SOIL MAP
MARYLAND
KENT CO. SHEET

MARYLAND AGRICULTURAL
EXPERIMENT STATION
H.J. PATTERSON, DIRECTOR

MARYLAND GEOLOGICAL SURVEY
WM. BULLOCK CLARK, STATE GEOLOGIST.

SOIL PROFILE
(3 feet deep)

Sassafras loam — Sc / Sc

Sassafras gravel loam — Ssc / Gr / Sc / Gr

Susquehanna gravel — Sc / Gr / Ssc / Gr

Norfolk sand — Ssc / Ssc

Elkton clay — Sic / Scc

Meadow — Sc / Scc

LEGEND

S Sand
C Clay
Ssc Sandy loam,
Gr Gravel
Gr Gravel loam
Sc Loam
Sic Silt loam
Scc Clay loam

LEGEND

Sl — Sassafras loam
Sgl — Sassafras gravelly loam
Sgr — Susquehanna gravel
Ns — Norfolk sand
Ec — Elkton clay
M — Meadow

BOUNDARIES

Soils Surveyed by
Jay A. Bonsteel
1900

BASE MAP FROM
U.S. GEOLOGICAL SURVEY
AND
MARYLAND GEOLOGICAL SURVEY

Scale 1:62500
1 0 1 2 3 4 5 Miles
1 0 1 2 3 4 5 Kilometers
Contour interval 20 feet.
Datum is mean sea level.

LITH. BY A. HOEN & CO., BALTIMORE, MD.

Field Operations
Division of Soils
1900